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ABSTRACT

A study examined the relationships among elementary school principals' knowledge of reading, principals' involvement in the school reading program, teachers' knowledge of reading, and elementary school student reading achievement. Subjects, 20 principals and 68 teachers from 20 schools in a small western city, responded to a 20-item survey designed to measure their knowledge of reading skills and process, reading program practices, and reading assessment. In addition, principals responded to 20 more questions designed to measure their level of involvement in school reading programs. For each school, grade 2 and grade 4 total reading raw scores were gathered. Regression analysis was employed to examine the collected data in an effort to determine the magnitude of the relationship among the selected variables of interest. Results indicated that: (1) significant positive correlations existed between grade 2 and grade 4 reading achievement and between the specific aspect of principal evaluation involvement and grade 4 reading achievement; (2) a significant negative correlation existed between teacher specific knowledge of program practices and global principal knowledge; and (3) teacher specific knowledge of program practices displayed a significant negative correlation with global principal involvement. Findings suggest that the two reliable predictors of grade 4 reading achievement are grade 2 reading achievement and global teacher knowledge of reading. An additional empirical study should be conducted to assess the relationship between principal involvement and teacher knowledge. (Three tables of data are included; 31 references are attached.) (RS)

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The Relationship Between Principals' Knowledge of Reading Process and Elementary School Reading Achievement

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A significant portion of the literature regarding effective elementary school reading programs discusses the relationship between principals' knowledge of reading and students' reading achievement. The bulk of this discussion centers around theoretical beliefs with few conclusions drawn from empirical study. Therefore, the focus of this study is on examination of the relationship between elementary school principals' knowledge of reading instruction and elementary student reading achievement while controlling for principal involvement and teacher knowledge.

Some suggest that the principal "must possess sound knowledge regarding effective methods, materials, and techniques . . . Teachers look to him for guidance and help in conducting their classroom reading programs" (Crisculo, 1969, p. 38).

Moreover, the elementary school principal must also understand the "nature of reading, the reading skills and abilities that characterize a good reader, and the elements of a good reading program." (Right to Read Effort, n. d., p. 3) Edwards (1982) supports this belief by noting that principals should know, understand, and appreciate the components of effective reading programs (Dowhower, 1989). Rauch (1974) is in full agreement when he states:

> The administrator should be knowledgeable about the reading process. His own experience as a classroom teacher, his observation of extremely competent teachers, enrollment in graduate courses in reading, attendance at conferences or extensive reading in the field may contribute to his knowledge. (p. 298)

"Principals who have intimate knowledge of the most effective techniques of classroom management and instruction are well prepared for discussions with teachers focused on the classroom." (Edmonds, 1982, p. 11) Austin (1979) reports that "successful schools are led by principals who are identified as an expert instructional leader, instead of an administrative leader, and the two levels of instructional expertise fall in the area of reading or arithmetic." (p. 12)

Research to date, however, which addresses the specific aspect of principal knowledge of reading appears inconclusive and contradictory. Some research reports that principals perceive themselves as relatively knowledgeable about reading (Doan, 1988). For example, Panchyshun (1971) conducted a self-report survey of 88 Iowa principals and 352 teachers. He concludes that principals believe that they are well trained in reading and feel that they are qualified to provide teachers with reading leadership.

In contrast, a larger number of studies conclude that the lack of knowledge to develop and maintain quality elementary school reading programs may have a direct bearing in the effectiveness of reading programs (Cox, 1978; St. John and Runke, 1977; Wood, 1981; Combs, 1983; Zinsk, 1975).

Additionally, some researchers have concluded that administrator's knowledge about reading or coursework in reading will have an influence on the school reading program (Manning and Manning, 1981; Austern, 1985). One study (Cummings, 1979),

however, concluded that teacher perception of principal leadership behavior rather than knowledge of reading had a significant impact on the reading achievement of children.

The purpose of the study is to examine the relationships between elementary school principals' knowledge of reading, principals' involvement in the school reading program, teachers' knowledge of reading, and elementary school student reading achievement.

Population Studied

Prospective principals and teachers from 26 elementary schools located in a small, western city of approximately 55,000 were invited to participate in this study.

Principals selected were required to have been in their present positions for a minimum of two years. Within each participating school, all grade two and grade three teachers who had been supervised by their present principals for a minimum of two years were invited to participate. Principals and teachers were guaranteed anonymity rather than confidentiality in order to enhance participation. All 1985 grade two and 1987 grade four students in each building were participants on the basis of each building's grades two and four total reading achievement raw test scores. Grades two and four were selected because grade three marks a turning point in reading instruction in most school programs. (Fry and Lagomarsino, 1982; Otto & Smith, 1970; Dowhower, 1984)

A total of 24 of the 26 eligible principals responded, and 79 teachers from 26 schools returned the survey instrument. Missing or incomplete responses required that four additional schools be discarded. Because of missing data, the final sample consisted of 20 schools, 20 principals and 68 teachers. From two to six teachers responded from each building.

Procedure

The district superintendent of schools was contacted in writing to obtain permission to invite principals and teachers in the district to participate in the study. Following the granting of superintendent approval, the president of the local teachers' professional organization was contacted in writing and in person in order to enhance the cooperation level of district teachers. This contact, and guaranteed anonymity, also helped to alleviate principal concerns over requesting the assistance of building teachers. To enhance the participants' desire to respond, the researcher included two small tokens of appreciation: a number two pencil and a packet of smoked almonds. In addition, the anonymous responses were placed on Scantron forms to reduce time requirements for both participant and researcher.

Participating principals of target schools asked those grade two and grade three regular classroom teachers who met the two-year teacher criterion to participate in the study. Target school principals were also asked to supply SAT 1985 grade two and 1987 grade four building total reading raw scores. Those students in each building who received greater than 50 percent of

their daily instruction from special education personnel were excluded from the study.

Instrumentation

The 1975 Revised Inventory of Teacher Knowledge of Reading (Artley & Hardin, 1975) was initially considered for use in this study. Studies indicated that the instrument failed to adequately discriminate among seven skill areas it purports to measure (Buros, 1978; Kingston, Brosier & Hsu, 1975; Koenke, 1976; Rorie, 1975, 1976). Faherty (1987), however, later concluded that the 1983 second revised edition was valid and reliable enough for use in assessing pre-service and in-service teachers' knowledge of reading instruction. These contradictory findings, coupled with the desire to use an instrument that reflects changes in the field of reading education over the past decade, resulted in the decision to create the Educators' Understanding of Reading, EUR.

The 40 item EUR was, therefore, designed by the researcher to meet the requirements of this study. Teachers and principals responded to both 20 items that were designed to measure their knowledge of (a) reading skills and process, (b) reading program practices, and (c) reading assessment.

The remaining 20 items were answered by principals to measure the level of their involvement in school reading programs in the following four areas: (a) instruction, (b) materials selection, (c) program development, and (d) program evaluation.

A number of important factors were given consideration during construction of the EUR questionnaire. Guidelines suggested by several writers (Berdie & Anderson, 1974; Orlich, Clark, Fagan & Rust, 1975) were utilized to maximize the quality of a questionnaire.

The instrument was also subjected to a pilot study. This procedure aided in determining validity and reliability as well as in locating ambiguities in the items. The pretest results were also analyzed to determine if the proposed statistical, analytical, and data collection methods would be effective when carrying out the main study. Procedures for item analysis were utilized to improve the instrument (Sax, 1980). In addition, reliability of the EUR was determined through the application of the Kuden-Richardson Formula 20 (KR^{20}). The resultant KR^{20} was .72.

Research Design

The study utilized bivariate and multivariate correlational methods to analyze the data collected from the target schools. Data was analyzed through ordinary or all-regressions multiple regression, and stepwise multiple regression. Building grade four total reading achievement raw scores on the SAT for the 1987 school year were the dependent variables in the regression analysis. The independent variables were (a) 1985 building grade two SAT total reading raw scores, (b) mean building global teacher knowledge of reading scores, and (c) global principal

knowledge of reading scores and (d) level of global principal involvement in the school reading program.

Additional independent variables of interest were also collected. These variables included three specific aspects of principal and teacher knowledge of reading: reading skills and process, program practices, and assessment. Four specific aspects of principal involvement--instruction, materials selection, program development, and evaluation--were also collected.

The stepwise method of entering independent variables into the regression equation was employed so as to maximize the coefficient of determination (R^2). Stepwise regression tests, at each step, the contribution of each variable already in the equation as if it were entered last. This procedure enables the model to identify variables which were earlier considered to be good, but with the inclusion of additional variables are no longer useful as predictors (Pedhazur, 1982).

Data Analysis

Ordinary or all-regressions, and stepwise multiple re-regression analysis were used to examine the degree of association shared by each of the independent variables: (a) global principal knowledge; (b) global principal involvement; (c) global teacher knowledge; (d) 1985 grade two student SAT total reading raw score; (e) principal skills and process knowledge; (f) principal program practices knowledge; (g) principal assessment knowledge; (h) teacher skills and process

knowledge; (i) teacher program practices knowledge; (j) teacher assessment knowledge; (k) principal instructional involvement; (l) principal materials involvement; (m) principal program development involvement; (n) principal program evaluation involvement; and the dependent variable, 1987 grade four student SAT total reading raw scores.

The analysis included:

1. Examination of scatter plots to determine linearity of relationships.
2. Examination of residuals for the possibility of autocorrelation.
3. Examination of the correlation matrix for the possibility of collinearity.

Specific Research Questions

This study addressed the following specific research questions:

1. Is there a relationship between grade four elementary student reading achievement as measured by SAT total reading raw test scores and global principal knowledge of reading as measured by the EUR?
2. Is there a relationship between grade four elementary school student reading achievement as measured by SAT total reading raw test scores and specific aspects of principal knowledge of reading: reading skills and process, reading program practices, and reading assessment as measured by the EUR?

3. Is there a relationship between grade four elementary school student reading achievement as measured by SAT total reading raw test scores and the level of global principal involvement in the school reading program as measured by the EUR?

4. Is there a relationship between grade four elementary school student reading achievement as measured by the SAT total reading raw test scores and specific aspects of principal involvement in the school reading program: instruction, materials selection, program development, and program evaluation as measured by the EUR?

5. Is there a relationship between grade four elementary school student reading achievement as measured by SAT total reading raw test scores and global teacher knowledge of reading as measured by the EUR?

6. Is there a relationship between grade four elementary school student reading achievement as measured by SAT total reading raw test scores and specific aspects of teacher knowledge of reading: reading skills and process, reading program practices, and reading assessment as measured by the EUR?

7. Is there a relationship between grade four elementary student reading achievement as measured by SAT total reading raw test scores and grade two elementary student reading achievement as measured by SAT total reading raw test scores?

Regression Analysis

The collected study data: principal and teacher global knowledge scores, principal and teacher specific aspects of knowledge scores, global and specific principal involvement scores, and grade two and grade four reading achievement scores were analyzed from an inferential perspective through application of regression analysis.

Regression analysis was employed to examine the collected data in an effort to determine the magnitude of the relationship among the selected variables of interest. Ordinary or all-regressions multiple regression on all variables in the set of hypothesized predictors was conducted first. Having determined the importance of two predictors: grade two raw achievement scores and teacher knowledge, stepwise regression was employed. Stepwise regression was used to enter the independent variables into the regression equation. This procedure enables the model to identify variables which were earlier considered to be good, but with the inclusion of additional variables are no longer considered useful as predictors (Pedhazur, 1982).

Table 1 depicts the correlations among all variables.

CORRELATIONS AMONG ALL VARIABLES

	Grade 2 Raw	Grade 4 Raw	Teacher Knowledge	Principal Knowledge	Principal Involvement	Teacher Reading Skills & Processes	Principal Reading Skills & Processes	Teacher Reading Program Practices	Principal Reading Program Practices	Teacher Reading Assessment	Principal Instruct. Involvement	Principal Materials Involvement	Principal Program Dev. Involvement
Grade 4 Raw	.656*												
Teacher Knowledge	.234	-.206											
Principal Knowledge	.086	.302	-.314										
Principal Involvement	.103	.321	-.325	.360									
Teacher Skills/Process	.325	.103	.558	-.002	-.191								
Principal Skills/Process	-.101	.132	-.139	.766	.164	.208							
Teacher Program Practices	-.168	-.233	.534	-.454*	-.485*	.039	-.395						
Principal Program Practices	.314	.263	-.306	.266	.079	-.234	-.179	-.255					
Teacher Assessment	.241	-.189	.780	-.156	-.081	.112	-.097	.210	-.058				
Principal Assessment	-.011	.166	-.143	.722	.398	-.273	.173	-.443	.004	.019			
Principal Instruct. Involvement	.038	.225	-.300	.285	.924	-.329	.225	-.499	.389	-.024	.762		
Principal Materials Involvement	.007	.176	-.364	.544	.846	-.173	.000	-.167	.011	-.122	.775	.714	
Principal Evaluation Involvement	.250	.455*	-.249	.259	.821	.107	.170	-.483	-.131	-.157	.694	.480	.695
Principal Program Development Involvement	.063	.264	-.219	.163	.908	-.027	.434	-.157	-.203	-.122	.320	.389	.294

TABLE 1

Correlations Among Variables

At the .05 confidence level (two-tailed), a correlation of .44 is required to indicate that a significant relationship exists between this study's variables. As Table 1 indicates, significant positive correlations exist between grade two and grade four reading achievement (.656) and between the specific aspect of principal evaluation involvement and grade four reading achievement (.455). A significant negative correlation (-.454) is depicted between teacher specific knowledge of program practices and global principal knowledge. Teacher specific knowledge of program practices displays a significant negative correlation (-.458) with global principal involvement.

Regression Analysis Results

Results of regression analysis are included in Tables 2 and 3.

TABLE 2

Ordinary Regression Analysis

Predictor	Coefficient	Standard Deviation	T-ratio	p
Constant	50.71	12.18	4.16	.001
Grade 2 Raw	.5638	.1324	4.05	.001
Teacher Knowledge	-1.0040	.6233	-1.61	.128
Principal Knowledge	.2803	.4838	.58	.571
Principal Involvement	.1110	.1831	.61	.553

S = 3.768 R^2 = 59.3 percent R^2 adjusted = 48.4

Unusual Observations

Grade 2 Raw	Grade 4 Raw	Fit	Stand. Dev. Fit	Residual	St. Residual
94.0	89.0	1.858	1.858	-6.819	-2.08R
75.0	90.0	82.475	2.496	7.025	-2.49R

TABLE 3

Stepwise Multiple Regression Analysis

Step Number	Constant	Grade 2 Raw	T-Ratio	Teacher Knowledge	T-Ratio	S	R^2	R^2 Adjusted
1	47.84	.50	3.68			4.07	43.0	
2	54.74	.57	4.54	-1.27	-2.32	3.65	56.70	.48

Analysis Summary

Both the ordinary regression and the stepwise regression pointed to the same conclusion: the two reliable predictors of grade four reading achievement are grade two reading achievement and global teacher knowledge of reading (Tables 2 and 3).

Examination of Table 3, stepwise regression, reveals that 43 percent of the variance is explained by grade two raw scores and an additional 13.7 percent is explained by teacher knowledge. Wherry's Formula is also applied to estimate shrinkage. This adjustment results in an R^2 of 48 percent. These findings are significant at the .05 level (two-tailed) and conclude that approximately 57 percent of the variance in grade four reading achievement can be explained by grade two achievement and paradoxically, teacher knowledge.

An examination of Table 2 shows ordinary regression of grade two achievement, global principal and teacher knowledge, and global principal involvement, results in a minute increase in R^2 to 59.3 percent. Grade two achievement and teacher knowledge, therefore, remain the two reliable predictors.

The negative correlation between global teacher knowledge of reading and grade four achievement is an unexpected and paradoxical result and will be discussed in the next section.

Conclusions and Discussion

One question reflected in the study asks if a relationship exists between teacher knowledge of reading as measured by the EUR and grade four elementary student reading achievement as

measured by the SAT. A modest and nonsignificant negative correlation of -.206 was revealed. The stepwise regression model included this variable with a negative weight. Regression analysis suggests that approximately 13 percent of the variance in the dependent variable is explained by this independent variable. Possible explanations for this paradoxical finding includes the following:

1. An examination of raw data from schools that display an unexpected combination of higher than mean achievement and lower than mean teacher knowledge leads to the following questions:

   A. The majority of schools scoring well below the mean in teacher knowledge were administered by highly involved principals. It is a possibility that such principals need to become highly involved due to less knowledgeable teachers. However, a yet unexplained relationship is a possibility. For example, do highly involved principals have an inverse effect on teacher and/or student performance? Several studies lend credence to this paradoxical question. Wallace (1980) reports that greater principal involvement in school reading programs lowers student achievement in reading. Wold (1982) notes that the greater a principal sees himself as a change agent the more negatively building teachers view

the climate of their school. Unanswered factors such as these could have confounded the results of this study.

B. School 4 indicated a decrease in those students eligible (SES data were collected on several schools) for free or reduced price meals. Changes in school student SES patterns may have confounded the results.

C. Individual teacher knowledge scores from five schools indicated an extreme range of knowledge. The need to utilize mean teacher knowledge scores from individual buildings and the resultant regression toward the mean may have confounded the results.

D. Teachers were required to have been with their respective principals for two years. Perhaps the high student achievement can, in part, be attributed to knowledgeable second grade teachers who were transferred or retired and were replaced by less knowledgeable teachers at the end of the grade two school year.

2. Further examination of the correlations among all variables, Table 1, leads to the following questions that may, in part, explain the unexpected negative relationship between teacher knowledge and student achievement:

A. Global principal knowledge and teacher specific knowledge of program practices are negatively correlated at the .05 significance level. Does the background of principals in the area of reading program practices conflict with teacher preferred practices?

B. Global principal involvement and teacher specific knowledge of program practices correlate negatively at the .05 level of significance. Do the philosophies of principals conflict with teacher preferred reading program practices?

3. While examination of the regression models in Tables 2 and 3 indicates that the teacher knowledge variable may bring additional information to the analysis it is possible that sampling fluctuation may have led to several cases shifting the weight to the negative. Nevertheless, the analysis highlights the relationship between teacher knowledge and principal involvement as worthy of further investigation.

Recommendations for future study should assess:

1. The study be replicated utilizing a research design that will analyze collected data at the class and individual student levels in addition to the school level.

2. The study be replicated utilizing a research design that will collect and analyze data on the knowledge

level of individual teachers rather than mean building teacher knowledge.

3. Additional empirical study should be conducted on the role and impact of principals employed in districts or states that mandate strong certification requirements regarding the area of reading.
4. Additional empirical investigation of building principals' roles in above and below average elementary school reading programs should be conducted.
5. The study be replicated using a larger and more representative sample of the national population.
6. Additional empirical study should be conducted that assesses the relative importance of principal knowledge of reading in contrast to principal involvement in effective reading programs.
7. Additional empirical study should be conducted to assess the relationship between principal involvement and teacher knowledge.

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